

## WHAT IS CLAIMED IS:

1. A method of forming buried wiring, comprising:
  - forming an insulating layer having a trench on a semiconductor substrate;
  - forming a conductive layer mainly composed of copper on said insulating layer in such a manner that said trench is filled with said conductive layer;
  - removing an oxide layer generated in a surface of said conductive layer by oxidation;
  - forming a cap layer made of a material having less mechanical strength than said oxide layer, on said conductive layer; and
  - removing said cap layer and a part of said conductive layer by chemical mechanical polishing in such a manner that said conductive layer is left in said trench.
2. The method according to claim 1, wherein said forming a cap layer includes:
  - subjecting a surface of said conductive layer to any of nitriding, boronizing, sulfurating, and phosphorating, thereby forming any of a nitride layer, a boride layer, a sulfide layer, and a phosphide layer in said surface of said conductive layer.
3. The method according to claim 1, further comprising:
  - forming a barrier layer on said insulating layer prior to said forming said conductive layer so that said barrier layer is disposed between said insulating layer and said conductive layer.
4. The method according to claim 1, wherein said forming a conductive layer comprises:
  - forming a seed layer mainly composed of copper on said

insulating layer; and

depositing a conductive material mainly composed of copper on said seed layer.

5. The method according to claim 1, further comprising:  
heat-treating said conductive layer at a temperature ranging from 100 °C to 350 °C.

6. The method according to claim 1, wherein said removing an oxide layer includes:  
deoxidizing said oxide layer.

7. The method according to claim 1, wherein said removing an oxide layer includes:  
removing said oxide layer by sputtering using an inert gas.

8. A method of forming buried wiring, comprising:  
forming an insulating layer having a trench on a semiconductor substrate;  
forming a conductive layer mainly composed of copper on said insulating layer in such a manner that said trench is filled with said conductive layer;  
forming a TiSiN layer on said conductive layer; and  
removing said TiSiN layer and a part of said conductive layer by chemical mechanical polishing in such a manner that said conductive layer is left in said trench.

9. The method according to claim 8, further comprising:  
removing an oxide layer generated in a surface of said conductive layer by oxidation.

10. The method according to claim 8, wherein said removing an oxide layer and said forming a TiSiN layer are carried out in

the same chamber.

11. The method according to claim 8, further comprising:

forming a barrier layer on said insulating layer prior to said forming said conductive layer so that said barrier layer is disposed between said insulating layer and said conductive layer.

12. The method according to claim 8, wherein said forming a conductive layer comprises:

forming a seed layer mainly composed of copper on said insulating layer; and

depositing a conductive material mainly composed of copper on said seed layer.

13. The method according to claim 8, further comprising:

heat-treating said conductive layer at a temperature ranging from 100 °C to 350 °C.

14. The method according to claim 8, wherein said removing an oxide layer includes:

deoxidizing said oxide layer.

15. The method according to claim 8, wherein said removing an oxide layer includes:

removing said oxide layer by sputtering using an inert gas.